

Appendix 1

Terms of Reference

1. Identify key examples of species that have been affected by climate and ocean changes;
2. Investigate and assess the impact of inter-annual and decadal-scale physical changes in relation to fishing effects;
3. Describe or hypothesize the mechanisms linking climate and ocean changes to changes in the population dynamics;
4. Using these mechanism and indices of climate change, examine the possibility of long-term forecasting of changes in population dynamics and ecosystem structure.

Appendix 2

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Appendix 3

Species List

A

Albacore tuna (*Thunnus alalunga*)
Amphipoda (*i.e.*, *Themisto gracilipes*, *Themisto japonica*, *Primno abissalis*)
Anchovy (*Engraulis japonicus*) also known as Japanese anchovy
Arrow worm (*Sagitta crassa*)
Arrowtooth flounder (*Atheresthes stomias*)
Atlantic cod (*Gadus morhua*)
Atlantic salmon (*Salmo salar*)
Atka mackerel (*Pleurogrammus monoptyerygius*)
Aurora rockfish (*Sebastes aurora*)

B

Big-eye sardine (*Etrumeus teres*)
Bighead croaker (*Collichthys niveatus*)
Big skate (*Raja binoculata*)
Black rockfish (*Sebastes melanops*)
Blue crab (*Portunus trituberculatus*)
Blue king crab (*Paralithodes platypus*)
Bocaccio rockfish (*Sebastes paucispinis*)
Butter sole (*Isopsetta isolepis*)

C

Canary rockfish (*Sebastes pinniger*)
Capelin (*Mallotus villosus*)
Chaetognatha (*i.e.*, *Sagitta crassa*) also known as arrow worms
Cherry salmon (*Oncorhynchus masou*)
Chilipepper rockfish (*Sebastes goodei*)
China rockfish (*Sebastes nebulosus*)
Chinook salmon (*Oncorhynchus tshawytscha*)
Chub mackerel (*Scomber japonicus*) also known as common mackerel
Chum salmon (*Oncorhynchus keta*)

Coho salmon (*Oncorhynchus kitusch*) also known as silver salmon
Common squid (*Todarodes pacificus*) also known as Japanese flying squid
Copepoda (*i.e.*, *Calanus pacificus*, *Neocalanus paracalanus*, *Pseudocalanus*)
Copper rockfish (*Sebastes caurinus*)
Curlfin sole (*Pleuronichthys decurrens*)
Cuttlefish (*Sepiella maindroni*)

D

Darkblotched rockfish (*Sebastes crameri*)
Dover sole (*Microstomus pacificus*)
Dusky rockfish (*Sebastes ciliatus*)

E

English sole (*Parophrys vetulus*)
Eelgrass (*Zostera*)
Euphausiida (*i.e.*, *Euphausia pacifica* or *Thysanoessa longipes*), also known as krill

F

Filefish (*Thamnaconus modestus*)
Flathead sole (*Hippoglossoides elassodon*)

G

Gizzard shad (*Clupanodon punctatus*)
Golden / brown king crab (*Lithodes aequispina*)
Greenland turbot (*Reinhardtius hippoglossoides*)
Greenstriped rockfish (*Sebastes elongatus*)

H

Hairtail (*Trichiurus lepturus*) also known as largehead hairtail (may be also *T. haumela*)
Half-fin anchovy (*Setipinna taty*) also known as scad
Harlequin rockfish (*Sebastes variegatus*)
Hydroid (hydrant) (*Obelia*)

J

Jack mackerel (*Trachurus japonicus*) also Japanese jack mackerel or horse mackerel
Japanese sardine (*Sardinops melanostictus*) also known as Japanese pilchard
Japanese sardinella (*Sardinella zunasi*) also known as large-eyed herring

K

Kelp greenling (*Hexagrammos decagrammus*)

L

Lingcod (*Ophiodon elongatus*)
Longnose skate (*Raja rhina*)
Longspine thornyhead (*Sebastolobus altivelis*)

M

Mantis shrimp (*Oratosquilla oratoria*)

N

Neon flying squid (*Ommastrephes bartrami*)
Northern shrimp (*Pandalus borealis*) known as a deep-water shrimp in Alaska
Northern rockfish (*Sebastes polyspinis*)
Northern rock sole (*Lepidopsetta polyxystra*)

P

Pacific cod (*Gadus macrocephalus*)
Pacific hake (*Merluccius productus*) also known as North Pacific hake
Pacific halibut (*Hippoglossus stenolepis*)
Pacific herring (*Clupea pallasii*)

Pacific ocean perch (*Sebastes alutus*)
Pacific sardine (*Sardinops sagax*)
Pacific saury (*Cololabis saira*)
Penaeid shrimp (*Penaeus chinensis*)
Petrale sole (*Eopsetta jordani*)
Pink salmon (*Oncorhynchus gorbuscha*)
Pomfret (*Stromateoides argenteus*)

Q

Quillback rockfish (*Sebastes maliger*)

R

Redbanded rockfish (*Sebastes babcocki*)
Red king crab (*Paralithodes camtschatica* or *camtschaticus*)
Rednose anchovy (*Thrissa kammalensis*)
Redstripe rockfish (*Sebastes proriger*)
Rex sole (*Glyptocephalus zachirus*)
Rock sole (*Lepidopsetta bilineata*)
Rosethorn rockfish (*Sebastes helvomagulatus*)
Rougheye rockfish (*Sebastes aleutianus*)

S

Sablefish (*Anoplopoma fimbria*)
Sand sole (*Psettichthys melanostictus*)
Sandpaper skate (*Bathyraja interrupta*)
Scad (*Decapterus maruadsi*), also known as round scad
Scaled sardine (*Harengula zunasi*)
Seabass (*Lateolabrax japonicus*)
Shrimp (*Pandalus* and *Pandalopsis* spp.)
 Pandalus goniurus known as a shallow-water shrimp in Alaska
 Pandalus dispar known as a deep-water shrimp in Alaska
 Pandalus hypsinotus known as a shallow-water shrimp in Alaska
Sharpchin rockfish (*Sebastes zacentrus*)
Shortbelly rockfish (*Sebastes jordani*)
Shortraker rockfish (*Sebastes borealis*)
Shortspine thornyhead (*Sebastolobus alascanus*)
Silvergray rockfish (*Sebastes brevispinis*)
Skate (*Raja porosa*)
Skipjack tuna (*Katsuwonus pelamis*)
Slender sole (*Lyopsetta exilis*)
Small yellow croaker (*Pseudosciaena polyactis*)
Snow crab (*Chionoecetes opilio*)
Sockeye salmon (*Oncorhynchus nerka*), also known as red salmon

Southern rough shrimp (*Trachypenaeus curvirostris*)
Spanish mackerel (*Scomberomorus niphonius*) also
known as Japanese Spanish mackerel
Spiny dogfish (*Squalus acanthias*)
Splitnose rockfish (*Sebastes diploproa*)
Spotted ratfish (*Hydrolagus colliei*)
Squid (*Loligo beak*)
Starry flounder (*Platichthys stellatus*)
Steller sea lion (*Eumetopias jubatus*)

T

Tanner crab (*Chionoecetes bairdi*)
Thornyhead rockfish (*Sebastes spp.*) see longspine
and shortspine thornyhead
Threadsail filefish (*Thamnaconus modestus*)
Tiger rockfish (*Sebastes nigrocinctus*)

V

Vermilion rockfish (*Sebastes miniatus*)
Viral hemorrhagic septicemia virus (VHSV),
i.e., *Ichthyophonus hoferi*

W

Walleye pollock (*Theragra chalcogramma*), also
known as Alaskan pollock
White croaker (*Argyrosomus argentatus*)
Widow rockfish (*Sebastes entomelas*)
Wolf eel (*Anarrhichthys ocellatus*)

Y

Yellow drum (*Nibea albiflora*)
Yelloweye rockfish (*Sebastes ruberrimus*)
Yellowfin sole (*Limanda aspera*)
Yellowmouth rockfish (*Sebastes reedi*)
Yellowtail rockfish (*Sebastes flavidus*)

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